Mental health and risk behaviours of rural-urban migrants: Longitudinal evidence from Indonesia

Yao Lu

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Contact information
Yao Lu
Department of Sociology, Columbia University
501 Knox Hall
New York, NY 10027, USA
Phone: 212-854-5442
Email: yao.lu@columbia.edu

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Abstract

Using longitudinal data from Indonesia and drawing on relevant literature—on the stress process, social support, and migrant assimilation—this study examines the consequences of rural-to-urban labour migration for mental health (as measured by depressive symptoms) and risk behaviours (as measured by smoking). The study addresses two analytic difficulties facing previous studies—the choice of an appropriate comparison group and selection bias. The results demonstrate that migration imposes considerable costs on mental health and encourages higher levels of smoking, and that the effects differ between women and men: female migrants tend to internalize the stress experienced in migration and display depressive symptoms, whereas male migrants tend to externalize various stressors by smoking more cigarettes if they already smoke though not by starting smoking. The negative impacts of migration are mitigated by family-level social support and a high degree of migrant assimilation.

Keywords: migration; internal migration; mental health; depression; risk behaviours; smoking

Introduction

So far, little work has systematically documented the health consequences of internal migration within less developed countries. This is in contrast to the growing attention given to the health implications of immigration in developed societies. Such studies usually find that, despite their socio-economic disadvantages, immigrants are healthier than the native-born population as indicated by various dimensions of health and health behaviours (Marmot et al. 1984; Williams and Collins 1995). This health advantage of immigrants, however, tends to diminish over the course of acculturation into the host societies (Landale et al. 2000; Abraido-Lanza et al. 2005). Though not all immigrants undergo the same process, this pattern of declining advantage largely results from various socio-economic and psychosocial processes accompanying migration, including a loss of social support, added work stressors, various legal and social barriers, and a detrimental effect of acculturation stress (Bhugra 2004; Takeuchi et al. 2007).

The literature on the stress process and social support illuminates how migration may influence the psychosocial outcomes of migrants. The disruption of family life can be viewed as a form of loss of social support. This is often compounded with arduous life circumstances and heightened stress in the migration and adjustment process, leading to diminished psychological and physical well-being (Lin and Ensel 1989; Aneshensel 1992). Migrants may continue to experience various stressful circumstances, described as acculturation stress, even as they adapt to the new social environments and lifestyles (Finch et al. 2004). In addition to its direct influence on health, social support can intervene in the stress process by

providing essential resources to cope with stress (Cohen and Wills 1985). This suggests that the reduced social support facing migrants probably further aggravates the costs of stress.

The degree to which these previous findings from immigrants to Western societies apply to internal migration has not been thoroughly investigated. There are signs that internal migrants may face many of the same problems that international migrants do. For example, mental illness, which used to be seen as a problem confined to industrialized societies, has become of increasing concern in less developed countries (Miller 2006). One of the most prevalent illnesses is depression, which can lead to poor quality of life and renders individuals vulnerable to health problems and unhealthy behaviours such as drug use and smoking (Sullivan and Rehm 2005). With respect to smoking, the World Health Organization projects that tobacco is expected to kill 10 million people globally in the next two decades, more than any single disease. About 70 per cent of the deaths will be in less developed countries (WHO 2008). The determinants of smoking behaviour are complex, involving not only biological but also psychosocial components (Marmot and Wilkinson 2006).

The aim of the research presented in this paper was to address the following questions, using Indonesia as a focus of study: Does migration within a country resemble international migration in being a stressful experience with health implications? Does the experience affect men and women differently? How do social support and assimilation moderate the health effects of internal migration? Another goal was to provide a more accurate account of the effect of migration by surmounting two difficulties facing earlier studies: the choice of an

appropriate comparison group and the possibility that self-selection by migrants may bias the results.

The study used longitudinal data from the Indonesian Family Life Survey to examine the effect of rural-to-urban labour migration on mental health and risk behaviours, respectively measured by depressive symptoms and smoking. Indonesia provides a useful context because it has a large population with a high prevalence of migration, especially internal migration (United Nations 2002). Given the great heterogeneity of migrants, I focus on rural-to- urban labour migration, which involves significant life changes and sparks most of the debate about the effects of internal migration. This group also represents the stream that most resembles international migration to developed countries because of the substantial differences between the origin and destination places (Pryor 1981). Challenges in understanding the health consequences of migration

The technical difficulties of studying the impact of migration have been summarized by Bilsborrow et al. (1984) and Jasso et al. (2004). First, the research question poses difficulties in conceptualizing the appropriate comparison group because the movement involves both the origin and the destination of migrants. Earlier studies largely concentrated on comparisons between migrants and the population at destination, for which data were readily available. While this is a useful way of studying migrants' adjustment, it is not a satisfactory way of studying the effects of migration on health because any direct effect of migration is conflated with the long-standing socio-economic and health disparities between the often

poor sending regions and the more developed receiving regions (Benatar 1998). If the receiving population has better or worse health profiles than the sending population, such a comparison tends to overstate or understate respectively the plight of migrants. The more appropriate approach is to contrast the situation of migrants with what would have been their situation had they stayed in the place of origin. This can be accomplished by comparing migrants with 'similar' people who remained in the sending regions.

The second difficulty of studying the impact of migration is that of disentangling causation from migrant selection. The self-selection of migrants is reflected not only in demographic and socioeconomic characteristics, but also in pre-migration health and other personal traits (Lu 2008). Many of these differences are unmeasurable. In such situations, the observed effect is not necessarily evidence of a migration effect, but may arise from the self-selection of migrants with attributes that also affect health status. For example, given the rigours of migration, those who choose to migrate are likely to be drawn from those who have good physical and mental health together with the capacity to cope with stress and difficulties (Kuo and Tsai 1986). Failing to control for such pre-existing differences between migrants and non-migrants can lead to the incorrect conclusion that there is a positive migration effect. This is often referred to as the 'healthy migrant effect' (Palloni and Morenoff 2001). This healthy migrant effect may apply to health-related behaviours, though some suggest the opposite: that migrants are selected from those willing to take calculated risks and are thus more prone to risk behaviours (Brockerhoff and Biddlecom 1999).

Thus far very little empirical work has addressed these difficulties owing to a lack of longitudinal data on migrants before and after migration in both origin and destination places. One goal of this research was to adopt a more appropriate analytic approach, one that could be adapted for migration studies elsewhere. The study simultaneously addressed the two difficulties described by modelling the change in migrants' health before and after migration, and contrasting it with the change in the proper comparison group—people who remain in migrant-sending regions.

The stress process, social support, and health Stress is conceptualized as a socially embedded process with important consequences for mental and physical well-being (Lin and Ensel 1989; Aneshensel 1992). The sources of stress consist of discrete life events or chronic life strains that entail a considerable amount of change or are perceived as disruptive or undesirable. Stress may show itself in a variety of ways, including psychological disorder, cardiovascular illness, weakened immune system, and unhealthy behavioral responses. These detrimental health consequences occur as a result of a disequilibrium in the functioning of the organism and resultant physiological stress. The unfavourable behavioral responses occur because risk behaviours such as drug use and smoking appear to enable people to achieve, temporarily, a greater sense of control over the stressors (Niaura et al. 2002).

The stressful experience does not render all people equally vulnerable to adverse effects on health. Various social resources that people mobilize in response to stress, in particular social support, can intervene at different points in the process and alter the consequences of stress

through the management of stressful circumstances or modification of the way problems are perceived (Cohen and Wills 1985). Social support comprises resources provided by others. These resources can be emotional or instrumental (physical, material, or informational) that help meet an individual's functional needs, and are often found to protect individuals from the adverse influences of stressful circumstances (Lin and Ensel 1989).

Social support also has a direct and positive effect on health because it produces positive experiences and a sense of stability and self-worth (Aneshensel 1992). The most important forms of social support are the emotional support and companionship provided by the individual's close family and friends. Informational and physical resources also can be crucial to health if trusted members of the social network promote healthier behaviours, help with daily needs, or provide necessary material resources.

Several studies have noted social variations in the health consequences of stress and social support. Gove and Tudor (1973) and Kessler et al. (1985) demonstrate the ramifications of gender roles for mental health and attribute the higher levels of emotional vulnerability observed among women to their gendered socialization experiences. These experiences also sustain differing norms of acceptable emotional expression for males and females. As a result, men are inclined to exhibit externalized expressions of distress such as substance abuse and cigarette smoking when facing stress, whereas women facing stress tend to show internalized or emotional reactions.

Migration, mental health, and risk behaviors

The mental health problems and risk behaviours prompted by immigration have been attributed to the changes required to adapt to the destination, a loss of social support, and other factors associated with the uprooting process of migration (Vega and Rumbaut 1991; Bhugra 2004). Previous studies also highlight the social variations in the immigration-health relationship by sex and by level of social support (Shen and Takeuchi 2001; Takeuchi et al. 2007). The health costs tend to be most prevalent among refugees, owing to the traumatic events that normally precede their arrival and resettlement (Watters 2001). However, accumulating evidence suggests that many of these losses and adjustments apply to voluntary migration.

A growing body of literature has highlighted the vulnerabilities of internal migrants to infectious diseases (Godfrey and Julien 2005), particularly HIV/AIDS (Lurie et al. 2003; Yang 2006), as they come into close contact with a new population and become exposed to a new social and economic environment. However, very limited work has been done on the mental health consequences of internal migration. The few exceptions yield mixed findings (Almeida-Filho et al. 1995; Wong et al. 2008).

Several forms of change associated with migration may operate as sources of stress (Shuval 2001). Physical and economic changes are among these sources. Moving between different places, migrants encounter a rapid change of living and working conditions. While economic migrants generally enjoy upward economic mobility and a sense of fulfilment, the economic

gains are often accompanied by exposure to work stressors and unfavourable working environments because migrants are overrepresented in undesirable and labour-intensive jobs (Walsh and Walsh 1987). The stress is heightened if migrants are committed to send large remittances to families back home or experience a gap between effort and achievement.

Compounding these stressors is substantial social change as migrants disengage from a network of social relations in the sending communities. The loss of social support, along with difficulties in establishing new social networks at the destination, results in feelings of loss and loneliness and may also exacerbate the negative impact of the stress process (Bhugra 2004). Migration is also associated with reduced social control of their behaviour: when individuals are detached from the restraining social influences that operated in their place of origin, they may be more prone to external influences and in consequence more likely to engage in health-adverse behaviours (Shuval 2001).

Another possible problem for migrants lies in the new institutional arrangements they encounter. While their destinations are generally equipped with better health infrastructures than the sending areas, migrants, especially illegal migrants, often encounter barriers to accessing local services. In particular, they often face discrimination, which can be the source of a diminished sense of self-efficacy that can have detrimental consequences for health and behaviours (Finch et al. 2000). Further, discrimination may create segregated residential, economic, and social environments that have adverse effects on migrants' welfare.

A subject of much debate has been the effect of the change in cultural setting as migrants endeavour to adapt to a new socio-cultural environment and cope with a different set of

norms and lifestyles (Finch et al. 2004). The debates focus on whether acculturation, which may lead to the health of migrants becoming increasingly similar to that of the native population, serves as a protective factor or a source of stress ('acculturation' or 'acculturation stress'). Previous studies suggest that acculturation is a dynamic and multidimensional process, the success of which depends on various social and personal factors that operate in the places of origin and destination and that can result in different levels and types of adaptation (Portes and Zhou 1993; Berry 1997). The classical assimilation model suggests that acculturation normally has favourable consequences—less social stress, better coping behaviours, and better socio-economic outcomes (Gordon 1964).

The proposition that acculturation has favourable outcomes has been challenged by many other studies that have documented its negative effects—the effects of so-called acculturation stress. The expression 'acculturation stress' refers to a long-term source of social stress stemming from the requirement to adapt to a new culture and its norms (Moscicki et al. 1989; Marks et al. 1990; Organista et al. 2003). As a result of the adaptation, the health behaviours and lifestyles of migrants become more like those of the native population, and the protective effects of their way of life in their country of origin are eroded. Increased time spent in the destination places is associated with deteriorating health outcomes. With respect to mental health, previous studies have documented higher rates of distress among long-term immigrants than among recent immigrants (Moscicki et al. 1989; Organista et al. 2003).

Internal vs. international migration

While most of the research discussed above has been in the field of immigration, many of the

mechanisms described also apply to internal migration. People moving within the same culture can also experience excessive stress and feelings of alienation, and face physical and social changes similar to those faced by international migrants. However, the structural and cultural barriers facing internal migrants are usually less substantial than those faced by cross-country migrants, for whom the degree of stress experienced depends on the amount of adjustment needed to fit into the host society and its level of resistance to the immigrants (Shuval 2001). It would therefore be reasonable to expect the migration-health relationship of internal migrants to differ from that of international migrants.

The study setting

The study was conducted in Indonesia, a country with large-scale internal migration and changing health profiles. Indonesia is the world's fourth most populous nation (234 million) and its largest Muslim country. The country has enjoyed rapid economic growth over the past three decades, along with concomitant improvements in health care and common measures of health such as life expectancy, infant mortality, and other common measures of public health (Frankenberg and Thomas 2001). In addition to government sources of care at hospitals, health centres, and village-level posyandus (health centres for children and mothers), there are various sources of private health care. Government hospitals and private services are located in district capitals, thus offering limited access to rural residents, who instead rely on health centres and posyandus as the basic source of care (Brotowasisto et al. 1988). The country is undergoing an epidemiologic transition, with a health profile changing towards one that increasingly resembles that of developed nations and most deaths in recent decades being

due to non-communicable rather than infectious diseases (Flood 1997). However, mental illness has become an emerging health concern, especially in urban areas (Mackinnon et al. 1998).

Indonesia is a major consumer and producer of tobacco products, ranking fifth globally in tobacco consumption (Achadia et al. 2005). Over 65 per cent of Indonesian adult males smoke regularly, but smoking is very rare among women. The rate is particularly high in rural areas, with clove cigarettes being the most popular type consumed. Tobacco control policies, however, have remained low on the political and public health agenda.

Indonesia has rapidly urbanized from under 20 per cent in the 1970s to over 40 per cent in 2000, a higher degree of urbanization than in many other less developed countries (United Nations 2002). The country is also recognized as one of the world's major sources of unskilled emigrating workers, especially to South-east Asian countries (Hugo 2002). The most recent census reports that one in ten Indonesians can be classified as a migrant, the majority of whom are internal migrants (Hugo 2000). They are mostly rural-to-urban and interurban migrants, motivated by the better economic prospects at the intended destination. The most common destinations are the largest cities, such as Jakarta and Surabaya. Earlier work on the characteristics of internal migrants (Hugo 2000) has shown that migrant workers are largely drawn from young adults, especially males. They are often better educated and from less well-off households, and generally take labour-intensive or service jobs in informal sectors. Owing to the large rural-urban income gap, there are marked earnings differentials

between migrants and non-migrants.

Research hypotheses

Our study was guided by four hypotheses about the relationship between internal migration and health. Hypothesis 1: Because migration constitutes a stressful process that may trigger mental illness and behavioural responses, rural-to-urban labour migrants are more likely than rural non-migrants to experience depressive symptoms and to smoke. Hypothesis 2: Because men and women tend to respond to stress in sex-specific ways, migrant women are more likely to exhibit internalized affective reactions such as depressive symptoms, whereas migrant men are more likely to show externalizing behavioural responses such as smoking. Hypothesis 3: Given that the level of stress experienced is likely to depend on the amount of social support received and that family support is likely to be the most crucial form of social support (Cohen and Syme 1985), the negative health and behavioural consequences of migration tend to be reduced when migrants are accompanied by family members. Hypothesis 4: Because as migrants integrate into their destination over time, they are better able to establish themselves in the labour market and reconstruct their social networks, their migration- related stress tends to decrease the longer they stay.

Data, measures, and methods

Data

The data used were from the 2000 and 2007 waves of the Indonesia Family Life Survey (IFLS), a high quality panel survey of individuals, households, and communities. The IFLS was conducted in 13 of the 27 provinces in Indonesia, representing 83 per cent of the

population. The first round (IFLS1) was conducted in 1993 and interviewed 7,224 households and 22,347 individuals. In 1997, IFLS2 was conducted to reinterview all IFLS1 households and respondents (Frankenberg and Thomas 2000). The IFLS has very low sample attrition. It represents one of the first efforts in less developed countries to track respondents who had moved out of their original households. Following the practice of IFLS2, IFLS3 and IFLS4, which were conducted in 2000 and 2007, successfully reinterviewed over 90 per cent of the households interviewed in previous waves (Strauss et al. 2009). The high follow-up rate substantially reduces the risk of biases that can arise from selective attrition.

The IFLS collected a broad array of demographic, socio-economic, and health information on individuals, households, and communities. Much of the information was collected repeatedly across the waves. Importantly, the IFLS contains detailed migration histories and a wide range of health indicators. In the migration history module, information on each trip longer than 6 months since age 12 and several characteristics associated with each trip (e.g., date, purpose, whether moved with other family members) was gathered. The information collected also included useful data on mental and physical health measures and health-related behaviours through self-reports and physical assessments. The questions asked about depressive symptoms were used in IFLS3 and 4 only. For this reason, only the 2000 and 2007 waves were used.

Measures

One of the outcome variables was depressive symptoms. The IFLS adopted a short screening

survey of psychological distress, not to diagnose specific psychological illnesses, but to assess the prevalence of symptoms of distress that are highly correlated with these illnesses. One question was designed to measure depressive symptoms: 'Have you experienced sadness in the last four weeks?' Although not ideal, other studies had shown that this measure could identify people with depressive affect reasonably well and consistently with clinical assessments in Indonesia and many other settings (Goldberg 1972; Jirojwong and Manderson 2001; Salomon et al. 2003). A dichotomous variable was constructed, coded 1 if the respondent had often or sometimes experienced the symptom in the past month.

In IFLS4, a short (ten-question) version of the Center for Epidemiologic Studies Depression Scale (CES-D) was added. CES-D is a widely used depression measure (Radloff 1977), and is a reliable and valid screening instrument for symptoms of depression in less developed as well as developed societies (Mackinnon et al. 1998). A short version rather than the complete 20-question version was adopted to minimize respondent burden. A continuous scale was constructed by adding all ten inventories (each using a four-point Likert scale from 0 to 3). The measure ranged from 0 to 30, with higher scores indicating more depression.

Two indicators of smoking behaviours were used. The first was a dichotomous measure indicating whether the respondent currently smoked cigarettes, smoked a pipe, or chewed tobacco. The second indicator was of the intensity of smoking, measured by the number of cigarettes consumed per day. Because the majority of smokers in Indonesia consumed fewer than ten cigarettes daily (Ganiwijaya et al. 1995), the measure was truncated at ten cigarettes

to reduce the leverage on the results of the small number of very heavy smokers. Sensitivity analysis showed that this procedure did not change the results. Smoking was the only measure of risky behaviours. Information on other behaviours such as alcohol and drug use was not sought by the survey because they were considered much more deviant than smoking in the Muslim culture. The major predictor variable, migration status, was constructed using information from the two consecutive waves on place of residence and migration histories. The analysis was restricted to respondents who had lived in rural areas in 2000 and contrasted rural-to-urban labour migrants with rural non-migrants. An individual was considered a rural-to-urban labour migrant if the person had moved from a rural area for work-related reasons and lived in an urban area by the 2007 wave. Those who stayed in the same rural area and never moved between the two waves were defined as rural non-migrants. A small number of return migrants was excluded because they might have contaminated the results if deterioration in their health had been the reason for their return (the 'Salmon Bias'). Because lifetime migration rate is relatively high in Indonesia and removing previous migrants would have reduced the sample size, respondents who had moved before 2000 were retained for the analysis but with their pastmigration controlled by FE modelling. As discussed in detail later, the FE approach effectively controlled for stable characteristics over the study period (2000-2007), including the respondent's migration experience before 2000.

To examine the effect of variations in social support, a three-category predictor variable was constructed that distinguished between rural nonmigrants, rural-urban labour migrants who had moved with family members, and rural-urban labour migrants who had moved alone. To

differentiate migrants by varying degrees of assimilation, a three-category predictor variable was used to distinguish between rural non-migrants, short-term rural-urban labour migrants (those who had moved to the destination after 2004 but had stayed in the destination for less than 3 years), and longer-term rural-urban labour migrants (those who had moved to the destination in or before 2004 and had stayed for 3 years or more). A sensitivity analysis (details not shown) showed that varying the cutpoint of length of stay had only a minor effect. Other covariates included standard demographic and socio-economic characteristics of the individual and household that might be important predictors of health and migration: age, sex, years of schooling, logged annual household income per head, household size, and marital status. Because physical health might be related to mental health and behaviours (Heidrich 1993), I also included a binary measure of self-reported poor or fair health in the model to obtain more conservative estimates. The exclusion of this measure did not change the results.

Methods

This study used longitudinal data to investigate both how the health of migrants evolved over time (before and after migration), and whether the changes in migrants' health differed from that of rural non-migrants. The fixed-effect (FE) models (Wooldridge 2002) were used to help disentangle the migration effect from possible migrant selection. The FE models essentially used each individual as his or her own control, and purged out stable but unmeasured attributes at the different levels (individual, family, and community) that might predispose migrants to have worse or improved health over time, independently of their actual migration experience. The stable unobserved heterogeneity assumption of the FE

approach was likely to apply in our study because many of the unobserved factors were past events or were highly heritable. Importantly, the FE approach also helped remove potential sample attrition bias that results from stable factors.

The FE models were implemented using conditional logistic regressions (when the outcome was mental health or current smoking) and conditional Poisson regressions (when the outcome was level of smoking). When there are two waves, FE models are similar to modelling changes in the outcome based on changes in the predictors, that is, before and after migration in this case. For logistic FE regressions, in each year:

$$\log(\frac{p_{it}}{1-p_{it}}) = \mu_t + \beta M_{it} + \gamma \mathbf{X}_{it} + \alpha_i \qquad (1)$$

where p_{it} is the probability that an individual i experiences a health condition at year t; Mit is the measure of migration status; $\mathbf{X}_{it}$ is a column vector of the explanatory variables; μ_t is an intercept; and α_i represents time-invariant unobserved heterogeneity it is regarded as a fixed parameter, one per person. The basic idea is to cancel out α_i using conditional maximum likelihood. The logic of FE Poisson models is similar, as shown in equation (2), where y_{it} is the expected number of cigarettes consumed per day:

$$\ln y_{it} = \mu_t + \beta M_{it} + \gamma \mathbf{X}_{it} + \alpha_i \qquad (2)$$

The interpretation of the FE models is similar to that of the corresponding logistic and Poisson regressions. A caveat is that when the outcome is not continuous, the conditional maximum likelihood algorithm deletes individuals without outcome variations over time, which reduces the sample size. Hence, when the outcome was level of smoking, I also

estimated corresponding linear FE models as a sensitivity test, which retained all cases. Another caveat to the FE approach is that time-invariant factors such as sex cannot be explicitly modelled. However, the trade-off is that many unmeasured confounders are effectively adjusted for. Although it is not possible to rule out all sources of bias, by focusing on labour migrants, the problem was largely reduced because this group was motivated by economic-related factors that were exogenous to health.

Also estimated were corresponding random-effect (RE) logistic and Poisson models, which can be formulated the same way as in (1) and (2). The difference is that α_i in RE models is considered to have a normal distribution and is explicitly modelled. Because the RE models assume that unobserved heterogeneity was uncorrelated with migration status, comparing them with the FE models offered the opportunity to evaluate the presence and degree of selection bias.

The FE model of depressive symptoms used the one-item question measure. The more accurate measure of depressive symptoms, CES-D, was only available in IFLS4, which meant that FE models could not be used. To assess whether the results applied when depression was measured by the better measure, I conducted sensitivity analyses using Ordinary Least Squares regressions to predict mental illness (CES-D) with the same set of explanatory variables described above, further controlling for pre-migration mental health state measured in IFLS3. Although this approach is not as rigorous as the FE models in addressing selection bias, it provided additional evidence on the impact of migration on

mental health using a better measure and the full sample. It also allowed for the incorporation of the native (urban) population in the analysis and helped evaluate how the results might differ using the native population as the comparison category.

Sample, attrition, and missing data

The sample included panel respondents aged 18-45 who originated from rural areas in 2000. The reason for focusing on this age group was because it accounted for the bulk of rural-urban migration in Indonesia. Using this age group also avoided the bias that might have occurred if older adults had been included and they had moved for health-related reasons. The individual attrition rate for the sample between 2000 and 2007 was about 24 per cent. This is substantially lower than the rate reported by many other panel studies, especially considering that the sample consists of the most mobile population, young rural adults. Additional analysis suggested that, after controlling for background demographic and socio-economic factors, attrition did not seem to be associated with previous health conditions. For most variables, data were missing on a few dozen cases. The final sample used complete cases only, after deleting the 3 per cent of cases that had any missing data.

Results

Descriptive statistics

Table 1 presents the summary statistics for the 2007 sample used for the analysis. The results show that men account for about 45 per cent of the sample and the majority of the sample are married. The average year of education is a little over 6 years and the household annual income per head is roughly 316 US dollars. These results confirm the low levels of

educational attainment and income in Indonesia. With respect to health, over 11 per cent of respondents report poor or fair health and almost 12 per cent report depressive symptoms in the previous month. The smoking rate is high: on average almost 35 per cent of adults smoke. When separating the statistics by sex, women are slightly more likely than men to report depressive symptoms (12 per cent vs. 11 per cent). Also, while only 1 per cent of women smoke, over 75 per cent of men are smokers. As for migration status, rural-urban labour migrants make up over 5 per cent of the sample. It is lower than the national-level figure of 10 per cent because migrants in other directions and for other purposes are excluded from the sample. Among the rural-urban labour migrants, almost 36 per cent moved with family members and over 65 per cent moved to their current destination after 2004.

The data also confirm common beliefs about the characteristics of rural-to-urban labour migrants based on their pre-migration characteristics measured in 2000 (results not shown). Migrants tend to be younger than non-migrants and more often to be men and single. They come from the better educated in relatively poor households. Their mental health state and smoking behaviour does not seem to be predictive of later migration behaviour. Although the coefficients are in the expected direction, namely, that those with better health are more likely to migrate, they are insignificant.

Health and behavioral consequences of migration

Regression results are shown in Table 2. A study of the FE models reveals strong evidence of the psychological costs of migration. Migrants are significantly more likely to report

depressive symptoms than non-migrants (OR=1.73). In contrast, there is no clear impact of migration on starting to smoke: although migration seems to increase the risk of smoking, the coefficient is insignificant. However, the intensity of smoking turns out to be significantly associated with the migration experience, with migrants consuming more than one cigarette per day (exp(0.291) =1.34). The corresponding analysis of the level of smoking using linear FE regression tells a similar story (β=0.887, p-value 0.001). These results are consistent with Hypothesis 1. Turning to other covariates, age is not related to depressive symptoms but is negatively associated with smoking. Higher levels of education and income lower the risk of depression but seem to increase the likelihood of smoking. The results resonate with previous studies documenting a protective effect of economic resources on mental health and a process of behavioural transition (Marmot and Wilkinson 2006). In the early stage of development, high socio-economic status (SES) increases the likelihood of unhealthy behaviours because it is mostly people with high SES who can afford to adopt them. It should be noted that income could serve as a mediating factor of the relationship between migration and health. Here it is included as a covariate to provide more conservative estimates. Sensitivity analysis (results not shown) without the income measure gives very similar results. I also conducted a similar set of analyses for all other types of migrants (results not shown), which showed no clear patterns. This is probably due to the great heterogeneity of non-labour migrants, who may move for a variety of different reasons (such as family-related reasons, marriage, social visits) that are less likely to entail stressful experiences than labour migration.

Evidence of selection

Comparisons between the FE and RE models in Table 2 reveal the effect of migrant selection,

because the differences in the coefficients and standard errors across the corresponding models are statistically significant. The effect of migration on mental health in the RE model is smaller than that in the FE model. The Hausman test of the difference is significant at the 0.05 level (Hausman 1978). This indicates a positive selection of migrants with respect to health that fosters their ability to move. Because there is no apparent direct effect of mental illness on the propensity for migration, this favourable selection is likely to take the form of resilience to health insults, which can lessen the stress and help migrants overcome the adversity associated with migration and settlement. Without proper adjustment for this aspect of selection, the impact of migration would be underestimated.

The results from the dichotomous smoking measure suggest the selection of migrants from those who are risk takers, but according to the Hausman test the difference is not significant. Results from the analysis of the intensity of smoking suggest otherwise: migrants are selected from those with healthier behaviours. If left unadjusted, the result would be an underestimation of the migration effect. It does not follow that migrants are not selected from those who tend to take risks, because the smoking measures may not adequately capture the propensity to take risks.

Variations by gender, family social support, and duration of stay

Results are shown separately by sex in Table 3 (women) and Table 4 (men), because interactions with both sexes are significant at the 0.01 level. There are substantial differences (Hypothesis 2). Female migrants have a higher risk of developing depressive symptoms than

female non-migrants (Model 1, Table 3). By contrast, there is no clear impact of migration on smoking (Models 4 and 7). Because cigarette use is very rare among women, these results for their smoking behaviours should be interpreted with caution. For men (Table 4), the pattern is reversed. No significant effect of migration on depressive symptoms is found, though the coefficient is in the expected direction (Model 1). This is consistent with expectations given gender norms. Migration does seem to trigger the onset of smoking (Model 4), but the evidence is inconclusive. This may be partially attributable to the fact that the majority of rural men were already smokers before they migrated. However, the intensity of smoking is closely associated with migration, with migrant men becoming heavier smokers after migration (Model 7). The effects of the buffering role of family social support are shown in Models 2, 5, and 8 in Tables 3 and 4. The results show that social support from families is an important factor in moderating the impact of migration on mental health among women and on smoking behaviours among men (Hypothesis 3). The deleterious effects on mental health are largely experienced by those female migrants who move alone. For those accompanied by families, the detrimental effect seems to be negligible. This pattern also holds for smoking among men, with solo male migrants particularly vulnerable to the uptake of smoking and an increase in its intensity after migration.

The role of assimilation is shown in Models 3, 6, and 9 in Tables 3 and 4. In contrast to many immigration studies that document a negative assimilation effect, the results reveal a beneficial impact of assimilation in the case of internal migration in Indonesia (Hypothesis 4). As female migrants become better integrated into their destinations and begin to establish

their own social networks, the negative consequences of migration on mental health disappear. But the detrimental effect remains strong for relatively recent migrants, those who stay at the destination for less than 3 years. In a similar vein, the detrimental impact of migration on smoking is concentrated for migrants who arrived recently and begins to improve over time as migrants stay longer at the destination. *Sensitivity analyses*

The results reported in Table 5 verify the earlier findings on depressive symptoms using a more reliable depression measure, CES-D, and the full sample. Migration appears to contribute to depressive symptoms (Model 1), especially among women (Model 4). For this reason, results for men are not shown. The ameliorating effects of family social support and level of assimilation are supported (Models 5 and 6). Models 2 and 3 incorporate urban non-migrants into the analysis to illustrate how using the native population as the comparison group may bias the results. Urban residents are more likely to report depressive symptoms than rural residents, but less so than rural-urban migrants (Model 2). Following most previous studies, the comparison group was changed to urban non-migrants (the native population). After this change, the impact of migration on mental health was substantially reduced (Model 3). The coefficient is reduced by half and becomes insignificant. This result highlights the importance of using the proper comparison group in studies of the effects of migration. Even though migrants tend to experience heightened stress and mental distress, the higher prevalence of depression in urban areas (destination) than in rural areas (origin) conflates the effect of migration with the rural-urban disparities in mental illness, leading to biased estimates.

Discussion

Migration has become an integral feature of the national economy and family life in many parts of the less developed world. A core element in assessing the consequences of migration is to understand its impact on social well-being with respect to health, which is critical in facilitating migrants' socio-economic attainments and their integration into host communities. Previous studies on immigrants from less developed countries to developed societies suggest that migration and settlement is a stressful process compounded by a loss of social support, with potentially negative impacts on mental health and health behaviours. The study reported in this paper exploited longitudinal data to study the effect of rural-urban internal labour migration on mental health and risk behaviours in Indonesia, using a method more appropriate than those usually applied. The results provide a basis for understanding similarities and differences between the phenomena of international migration and internal migration.

The results demonstrate an adverse effect of internal migration on psychological health measured by depressive symptoms, and on risk behaviours measured by levels of smoking. As in the case of international migration, the malign effects seem to be largely consequences of the rupture of social support systems and exposure to the arduous living conditions that often attend migration. The findings also endorse the gender-role proposition that the association between migration and health varies by sex and is disorder specific: male migrants are more likely to externalize stress-induced distress by such means as the use of tobacco products; female migrants are more susceptible to internalized psychological distress

such as depression.

The research also identified several protective factors. First, the expectation that the social support of families would have a buffering effect against stress was confirmed. This finding echoes the well-documented evidence of the importance of social support for health found in Western societies: in resource-constrained settings, social support has not only a direct and positive effect on health but also cushions the detrimental influences of various life stressors. Secondly, there is evidence of the beneficial role played by migrants' assimilation. The results show that the negative psychological and behavioural impact of migration tends to be concentrated in the first few years after arrival, with a return to normal levels thereafter. The process of assimilation, in other words, marks the course of favourable psychological and behavioural adjustment over time. This suggests that the emphasis on acculturation stress in the immigration literature needs to be modified when considering internal migration. In the case of international migration, the assimilation process is a highly complex and stressful one, and the levels of stress experienced and adjustment required will depend on the magnitude of the differences in social and cultural environments between the sending and receiving societies. Although internal migration is also a source of stress, the adjustment process is likely to be much less disruptive than international migration because social and cultural barriers are less likely to be encountered and less effort is required to re-establish social and economic roles.

Comparisons of the analytic approach used in earlier studies with the approach adopted in

this study underline the importance of addressing selection bias and using the appropriate comparison group in studies of migration and health. This study found that people with healthier psychological and behavioural traits and especially those with better ability to handle stress were more likely to migrate. If left unadjusted, this fact would lead to an underestimate of the effect of migration on health. In addition, using the host population as the comparison group confounds the effect of migration with long-standing differences in health profiles between the sending and receiving populations. Instead, the health of migrants should be compared to that of similar people in the place of origin, since this indicates what the health of migrants would have been if they had stayed in the place of origin. While the degree to which these findings can be generalized requires further study, the methods used are applicable across settings.

Several limitations of the study need to be acknowledged. The relatively small size of the sample of migrants limited the possibility of further disaggregating the effects of migration by a combination of interesting factors such as age, sex, duration of stay, and whether accompanied by family members. Another important factor was the distance of migration. It is plausible to suppose that migrants moving only a short distance from the place of origin would be likely to experience a lower level of stress than those moving longer distances, because the environments would be more similar and less social and cultural adjustment would be required. However, the limited information on distance available in the data meant that the effect of distance could not be explored. Other constraints imposed by data limitations were that smoking was the only available indicator of risk behaviours and the

measures of social support and assimilation available were far from ideal. Our understanding of the effects of migration on health will be substantially enhanced if better data are collected in future. To pin down the way migration functions we need longitudinal studies that provide information about the characteristics of migrants at both their origin and their destination, a rich set of health and behavioural measures, and better measures of social support and assimilation. Since labour migration continues to be important in many countries, it is well worth investing in improved data on this topic.

Despite these limitations, much has been learned about the health consequences of internal migration. The findings that migration constitutes a non-trivial determinant of mental health and health-related behaviours should be of general interest, given the global increase in migration and widespread reports of surging mental illness. This study has identified several important challenges facing migrants, including substantial psychological distress and the intensification of risk behaviours, which can have far-reaching implications for health. Migrants might benefit from intervention programmes that help them cope with family separation, facilitate family migration, rebuild social ties, and deal with various other difficulties entailed in post-migration adjustments. Given the heterogeneous effects by sex, sex-specific interventions would be especially helpful.

The present study focused on one less developed country. To advance the themes addressed here, comparative work in other socio-economic settings is needed. Considerable similarities across settings are expected, because migration streams are typically generated by similar

forces and, hence, experience similar problems. Nevertheless, the patterns are likely to vary between differing socio-economic and institutional settings. While internal migration in Indonesia represents an example of 'open' movement, which is generally observed in the case of internal migration, there are well-established examples of 'constrained' migration, with movement hampered by restrictive policies (e.g., international migration, the hukou system and rural-urban migration in China, and the Influx Control of black migration in South Africa during apartheid). Comparative research would allow a more profound exploration of the relationships between migration and health.

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Table 1. Percentages and means of variables used for a study of internal migration in Indonesia, 2007 (N=5,250)

Variables	Mean or Percentage
Dependent variables	
Depressive symptoms	11.7
CES-D score	3.9
Currently smoking	34.7
Number of cigarettes per day	4.0
Independent variables	
Rural-urban labor migrants	5.2
Among rural-urban labor migrants	
Moved with family members	35.7
Moved without family members	64.3
Among rural-urban labor migrants	

Age	
15-25	11.0
26-35	32.4
36-45	36.0
46-55	20.6
Male	45.3
Years of education	6.4
Marital status	
Never married	9.8
Currently married	84.6
Other	5.6
Per head HH annual income	2,940,870
HH size	5.2
Self-reported poor or fair health	11.5

Note: In 2007, 1 U.S. dollar ≈ 9,300 Indonesian Rupiah. *Source:* Indonesia Family Life Survey.

Table 2. Results of fixed- (FE) and random-effect (RE) models predicting depressive symptoms and smoking behaviours on migration status and other covariates, Indonesia, 2000-2007 (p-values in parentheses)

	Depressive symptoms [1]		Currently smoking [1]		No. of cigarettes per day [2]	
	FE	RE	FE	RE	FE	RE
Rural-urban labor migrants						
(ref. rural non-migrants)	0.549*	0.455+	0.399	0.978*	0.291***	0.171***
	(0.042)	(0.084)	(0.393)	(0.023)	(0.000)	(0.000)
Age (ref. 15-25)						
26-35	0.053	0.044	-0.849**	0.124	-0.157***	0.089***
	(0.750)	(0.738)	(0.006)	(0.605)	(0.000)	(0.000)
36-45	0.012	0.059	-2.539***	-0.101	-0.414***	0.082**
	(0.964)	(0.676)	(0.000)	(0.694)	(0.000)	(0.005)
46-55	-0.145	-0.100	-4.478***	-1.337***	-0.714***	0.009
	(0.711)	(0.619)	(0.000)	(0.000)	(0.000)	(0.813)
Male	--	0.025	--	-0.113	--	0.711***
		(0.778)		(0.660)		(0.000)

Years of education	-0.070+	-0.003	0.129*	-0.007	0.025**	-0.002
	(0.059)	(0.788)	(0.049)	(0.697)	(0.001)	(0.347)
Marital status (ref. never married)						
Currently married	-0.142	-0.092	-0.358	0.328	-0.001	0.156***
	(0.503)	(0.500)	(0.291)	(0.162)	(0.981)	(0.000)
Other	0.524+	0.286	-0.573	0.323	-0.011	0.193**
	(0.098)	(0.206)	(0.371)	(0.484)	(0.878)	(0.001)
Log per head Household annual income	-0.038*	-0.032*	0.047	0.050	0.011**	0.013***
	(0.024)	(0.040)	(0.218)	(0.112)	(0.009)	(0.000)
Household size	0.013	-0.000	-0.004	0.004	-0.004	0.006
	(0.649)	(0.996)	(0.944)	(0.900)	(0.484)	(0.122)
Self-reported poor or fair health	0.756***	0.646***	0.088	0.141	-0.004	0.003
	(0.000)	(0.000)	(0.754)	(0.548)	(0.887)	(0.880)
Survey year 2007 (ref. 2000)	-1.268***	-2.522***	1.397***	1.202***	0.250***	0.060***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Constant	--	1.627***	--	-1.377**	--	0.856***
		(0.000)		(0.003)		(0.000)
N	3,262	3,262	866	866	3,956	3,956

Note: N is the number of observations for panel respondents.

[1] They are logistic FE and RE models. Log odds are shown.

[2] They are poisson FE and RE models. Log odds are shown. Corresponding linear FE and RE models are estimated, which give similar results.

*** *p* value < 0.001; ** *p* value < 0.01; * *p* value < 0.05; + p value < 0.1.

Source: Indonesia Family Life Survey.

Table 3. Results of fixed-effect models predicting depressive symptoms and smoking behaviuors by migration status and other covariates for females, Indonesia, 2000-2007 (p-values in parentheses)

	Depressive symptoms [1]			Currently smoking [1]			No. of cigarettes per day [2]		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Rural-urban labour migrants									
(ref. rural non-migrants)	0.936*			-5.843			-1.306		
	(0.020)			(0.999)			(0.999)		
Whether moving with family members									
(ref. rural non-migrants)									
Moved with family members		0.875			-5.843			-1.306	
		(0.115)			(0.999)			(0.999)	
Moved without family members		0.992+			--			--	
		(0.062)							
Length of stay at destination									
(ref. rural non-migrants)									

Moved to cities in or before 2004		-0.197	-5.843	-1.306
		(0.801)	(0.999)	(0.999)
Moved to cities after 2004		1.622**	--	--
		(0.001)		
N	1,898	84	100	

Note: Other covariates shown in Table 2 were also used for this analysis but the results are not shown. N is the number of observations for panel respondents. Number of cases in the analysis of smoking behaviours was very small*too small to allow further disaggregation by social support and assimilation (Models 5, 6, 8, and 9).

[1] Logistic FE models. Log odds are shown.

[2] Poisson FE models. Log odds are shown. Corresponding linear FE models were estimated and gave similar results.

*** *p* value < 0.001; ** *p* value < 0.01; * *p* value < 0.05; + p value < 0.1.

Source: As for Table 1

Table 4. Results of fixed-effect models predicting depressive symptoms and smoking behaviours on migration status and other covariates for males, Indonesia, 2000-2007 (p-values in parentheses)

	Depressive symptoms [1]			Currently smoking [1]			No. of cigarettes per day [2]		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Rural-urban labor migrants (ref. rural non-migrants)	0.022			0.793			0.308***		
	(0.952)			(0.104)			(0.000)		
Whether moving with family members (ref. rural non-migrants)									
Moved with family members		0.403			0.531			0.081	
		(0.490)			(0.540)			(0.378)	
Moved without family members		-0.168			0.885			0.426***	
		(0.706)			(0.114)			(0.000)	
Length of stay at destination (ref. rural non-migrants)									

Moved to cities in or before 2004		0.555	0.105	0.110
		(0.320)	(0.873)	(0.222)
Moved to cities after 2004		-0.123	1.116+	0.411***
		(0.794)	(0.099)	(0.000)
N	1,364	782	3,852	

1Logistic FE models. Log odds are shown.

2Poisson FE models. Log odds are shown. Corresponding linear FE models are estimated, which give similar results.

*** *p* value < 0.001; ** *p* value < 0.01; * *p* value < 0.05; + p value < 0.1.

Note: Other covariates shown in Table 2 were also used for this analysis but the results are not shown. N is the number of observations for panel respondents.

Source: As for Table 1.

Table 5. Results of linear models predicting depressive symptoms (CES-D) by migration status and other covariates, Indonesia, 2000-2007 (p-values in parentheses)

	Overall sample			Females		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Rural-urban labor migrants						
(ref. rural non-migrants)	0.549*			0.857*		
	(0.013)			(0.014)		
Including urban non-migrants						
(ref. rural non-migrants)						
Rural-urban labor migrants		0.418*				
		(0.047)				
Urban non-migrants		0.193*				
		(0.012)				
Including urban non-migrants						
(ref. urban non-migrants)						
Rural non-migrants			-0.193*			

	(0.012)		
Rural-urban labor migrants	0.225		
	(0.288)		
Whether moving with family members			
(ref. rural non-migrants)			
Moved with family members		0.513	
		(0.271)	
Moved without family members		1.195*	
		(0.012)	
Length of stay at destination			
(ref. rural non-migrants)			
Moved to cities in or before 2004			0.700
			(0.360)
Moved to cities after 2004			0.900*

						(0.018)
N	5,250	10,019	10,019	2,872	2,872	2,872

$^{***}p$ value < 0.001; $^{**}p$ value < 0.01; $^{*}p$ value < 0.05; + p value < 0.1.

Note: Other covariates shown in Table 2 were also used for this analysis but the results are not shown. An additional covariate, pre-migration mental health state measured in 2000, is included in the models.

Source: As for Table 1.